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METHOD FOR PRODUCING A FOAM ELEMENT, ESPECIALLY A FOAM PADDING ELEMENT FOR A PLANE OR VEHICLE SEAT

The invention relates to a method for producing a foam element, especially a foam padding element for a plane or vehicle seat, in which a layer of material is applied to at least one shaping wall section of a foaming mold, which material layer during the foaming process forms a barrier layer between the foam material and the relevant wall section.

Methods of this sort are already known. The construction of a barrier layer which prevents direct engagement of the foam material with the shaping wall of the foaming mold tends to simplify removal from the mold, and caking or baking onto the shaping wall is prevented in the area of the barrier layer. However problems arise with the application of such a layer forming the barrier layer and with its fixation to the shaping wall. Because of the application of the forces working during the foaming process on the shaping wall section, the danger of displacement of the layer which has been inserted into and embedded in the mold and/or the danger of formation of folds exists, whereupon among other things surface defects or flaws arise on the foam element being produced.

The object of the invention is to demonstrate a method of the aforementioned type which is distinguished by its capacity for simple execution and therefore leads to improved properties of the products obtained by the method.

With a method of this type this problem is solved according to the invention in that a fleece with ferromagnetic coating is used as the layer forming the barrier layer and that the fleece is held in its position detachably on the wall section by means of a cooperating device producing a

magnetic field.

The use of a ferromagnetically coated fleece provided by the invention obtains a plurality of remarkable advantages. The embedding into the foaming mold is set up to be very simple. The fleece need only be engaged on the wall of the foaming mold, on which it is held in position by the cooperation of the ferromagnetic coating with the magnetic field being generated on the relevant wall section. To produce the magnetic field, permanent magnets are provided preferably in suitable layer arrangement on the foaming mold. The fleece fits snugly with its ferromagnetic coating without forming folds on the shaping wall, and as required it is fitted to a contoured strip of the relevant wall section. The layer of fleece remains held in place by the magnetic holding forces during the foaming process.

While the ferromagnetic coating of the fleece engaging on the wall section of the foaming mold forms a good foam barrier, in other words a very effective protection layer against the wearing through of foam material on the wall section, the reverse side of the fleece which is free of coating facilitates a good binding with the foam element produced during the foam process, by penetration of the foam material into the structure of the fleece. This fleece is thus fastened securely to the relevant surface area of the foam element by means of the foaming attachment. In this relationship the method of the invention is suitable in a special manner for the production of foam padding parts for seats, in which mechanical devices are built into or built on the reverse or interior side of the relevant foam padding part, which are for example operating devices for seat or backrest adjustment and/or for the adjustment of headrests relative to backrests. The fleece fastened to the relevant surface areas of the foam padding part with its ferromagnetic coating forms a friction-free protection layer to counter wearing through of the foam part by the relevant mechanical parts.

Preferably a composition is used as ferromagnetic coating, the composition including 80 parts polyurethane and 20 parts ferrite powder which is processed with a binding agent into an easily spreadable mass of material. This material is preferably wiped on by means of a blade or coating nozzle forming a strip on a relevant carrier which is being moved relative to the applicator.

With this arrangement, the fleece to be coated in turn can be used as carrier, and the easily spreadable material is spread directly thereon.

Alternatively a strip of a silicon-coated carrier (e.g. paper or foil) can be moved relative to the applicator and thus can be provided with the coating. In this case the coated carrier together with a strip of the fleece while being supported is guided through a laminating arrangement and the coating of the carrier is applied by lamination on the fleece. Following separation of the strips of the carrier and the fleece carrying the coating, the carrier can be rolled up in order to be used again for another coating process.

The object of the invention is also a foam element produced by the method disclosed, the foam element incorporating the features included in Claim 11.

Hereinafter the invention is to be explained in greater detail relative to the drawing. In the drawing are shown :

Fig. 1 a perspective view of a foam padding element which forms the frontal support part of the backrest of a vehicle seat;

Fig. 2 a reverse view of the arrangement of the foam padding element shown in Fig. 1, in somewhat larger scale,

Fig. 3 a diagrammatically considerably simplified representation of a device for the production of a coated fleece for use during execution of the method

according to the invention, and

Fig. 4 a representation similar to that of Fig. 3 of a modified device for the production of a coated fleece.

Fig. 1 shows a foam element 1 in the form of a foam padding element for a vehicle seat, whereby it involves the front part of a backrest support which on its forward side 3 incorporates the shape which is ergonomically suitable for the support of the back of the rider in the seat. On its reverse side 5 the foam element 1 forms a depression in the form of a shallow saucer, which is intended to receive the mechanisms associated with the backrest, in other words having to do with the supporting metal frame as well as the operation and adjustment devices, for example for the height adjustment of the headrest, of which the support rods extend upward through the top part of foam element 1. These components indicated here as 'mechanisms' are not shown in the drawing.

As is especially clear in Fig. 2, the base of the saucer-like depression on reverse side 5 is covered by a fleece 7, which during the foaming process is attached by foaming onto the relevant surface of foam element 1. The exposed exterior of fleece 7 has a ferromagnetic coating 9. Ferrite particles are added to coating 9, which in the present example is a layer of a polyurethane, and then on the exposed exterior of fleece 7 it forms a smooth, thick and friction-free layer. Coating 9 has such an effect during the foaming process, wherein coating 9 engages on the shaping wall of the foaming mold, where it serves as a foam barrier, that the foam material in cooperation with the free reverse side of fleece 7 can indeed attain a good binding, which is prevented nonetheless by said coating 9 from direct contact with the shaping wall. Thus any caking or baking of the foam material onto the shaping wall is avoided and the shaping of the foam element is simplified.

Because of the ferromagnetic property of coating 9, the fleece 7 following embedding in the

foaming mold can be secured in its engagement on the shaping wall of the same, by means of a suitable magnet arrangement which can provide security. A thrusting, folding, warping or twisting by the forces coming into play during the foaming process is therefore avoided, without requiring the provision of special holding means on the shaping wall of the foaming mold. Strips of permanent magnets could be provided to serve as the magnet arrangement, being arranged along the edges of fleece 7 on the exterior of the foaming mold.

Fleece 7, which, as shown in Figs. 1 and 2, is foamed on foam element 1 in such a manner that coating 9 is turned toward the mechanism mounted in the backrest of the relevant vehicle seat, with its coating 9 forms a smooth, low-friction and wear-resistant layer and therefore provides protection against wearing through of the surface of foam element 7 by parts of the mechanism as a result of their vibrations or as a result of operational movements of corresponding mechanism parts.

Figs. 3 and 4 show in detail two different methods of proceeding for production of fleece 7 with ferromagnetic coating 9. In both cases, the basic material which is used is a non-coated PET-fleece 11 of 20 to 60 g/m^2 and preferably approximately 40 g/m^2, to which is applied the 60 to 100 g/m^2 and preferably approximately 80 g/m^2 of ferromagnetic coating 9. This coating is applied as spreadable material by wiping on with an applicator. This material can for example be a mixture of 80 parts polyurethane SU 4715 (Firma Stahl) or some similar polyurethane material with the addition of 20 parts ferrite powder of granular size 10 microns, whereby Butamon is used as diluting medium, in order to process the mixture into an easily spreadable mass of material of approximately mPa · S.

In the example shown in Fig. 3, the easily spreadable mass forming coating 9 is applied directly on a strip of the non-coated fleece 11, unwound from a supply roll, and the strip of non-coated

fleece 11 is carried through a coating device, in the case of the example being shown by an applicator 13. The strip of fleece 7 with already applied and still wet coating 9 is thus carried through a dryer 15 and following drying of coating 9 is rolled up into a roll 17.

Fig. 4 shows a modified process for the execution, in which the easily spreadable material forming coating 9 is not beiung applied directly by means of the applicator onto non-coated PET-fleece 11, but rather first of all onto the strip of a silicon-coated carrier 17, for example in the form of a strip of paper or foil, which is added from a supply roll 19 of applicator 13. Following application of coating 9 on support 17, this together with the strip of non-coated PET-fleece 11 is fed to a calendar arrangement 21, where coating 9 is transmitted from carrier 17 onto fleece 11 by the coating on of a lamina. Subsequently the strips of carrier 17 and fleece 7 having coating applied thereon run through the dryer 15. Following running through dryer 15, carrier 17 is separated from coated fleece 7 and is rolled separately into a roll 23. Coated fleece 7 is rolled into the roll 25. The carrier rolled into roll 23 can be used again, in other words for another manufacturing process for which it can replace the supply roll 19, when this roll is depleted.